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size to displace the requisite quantity of mercury (placed in another cylinder, slightly larger, in which the polar axis will turn) to reduce it to any amount. The eighth condition as regards the silvering of the glass surface is not so difficult to meet as might have been expected; as it has been found quite practicable to silver an 18-inch mirror by simply putting a band of suitable material round the edge, so as to form a dish with the mirror as the bottom, pouring in the solutions properly filtered, and allowing the silver to deposit, thereby getting a really good film, we need not anticipate that there would be any difficulty with large sizes. As to protecting the mirrors from dew when a mirror is uncovered for a night's work, the temperature of the air, as a rule, falling more rapidly than the mirror parts with its heat, prevents dewing, and it is only necessary to have some covering vertically above to prevent the dew actually falling on the mirror. A screen for this purpose could be made and used without destroying the first condition. The ninth condition is of great importance to the observer. There is nothing in my opinion which would equal an arrangement similar to the altazimuth mounting of Herschel's largest telescope revolving round the Equatoreal, but of course quite detached therefrom, with such a width of platform as to give say two hours' observation on the meridian, and either with the sloping sides for the platform to work on, or with sides curved to such a radius as to keep the platform a constant distance from the telescope at any elevation. Such a platform properly counterpoised would be safe, steady, and easily accessible by a ladder or stairs, while the open character of the structure is not unfavourable to the telescope.

The last condition being beyond the scope of this paper, and involving considerations of such a different character, I propose to leave it for independent discussion at some future time.

March 31, 1879.

On some Formulæ for expressing the value of the Excentric Anomaly etc. in terms of the Mean Anomaly. By M. A. De Gasparis.

Il peut être utile, pour le calcul des perturbations, d'exprimer la valeur de l'anomalie excentrique, vraie, du rayon vecteur, des coordonnées héliocentriques, etc., en fonction de l'anomalie moyenne, donnée en parties du rayon. J'ai trouvé les formules suivantes:—

$$E = \frac{M}{1-e} - \frac{M^3}{6}\frac{e}{(1-e)^4} + \frac{M^5}{120}\frac{e+9e^2}{(1-e)^7} - \frac{M^7}{5040}\frac{e+54e^2+225e^3}{(1-e)^{10}} \dots$$

$$(1-e^2)^{-\frac{1}{2}} \sin v = \frac{M}{1}\frac{1}{(1-e)^2} - \frac{M^3}{6}\frac{1+3e}{(1-e)^5} + \frac{M^5}{120}\frac{1+24e+45e^2}{(1-e)^8} - \frac{M^7}{5040}\frac{1+97e+947e^2+1755e^3}{(1-e)^{11}} \dots$$

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$$\frac{\gamma}{a} = 1 - e + \frac{M^2}{2}\,\frac{e}{(1-e)^2} - \frac{M^4}{24}\,\frac{e+3e^2}{(1-e)^5} + \frac{M^6}{720}\,\frac{e+24e^2+45e^3}{(1-e)^8}$$
$$-\frac{M^8}{40320}\,\frac{e+97e^2+947e^3+1755e^4}{(1-e)^{11}}\cdots$$

$$\frac{z}{a \sin i} = (1-e)\sin(\pi-\phi) + \frac{M}{1}\sqrt{\frac{1+e}{1-e}}\cos(\pi-\phi) - \frac{M^2}{2}\,\frac{\sin(\pi-\phi)}{(1-e)^2}$$
$$-\frac{M^3}{6}\sqrt{\frac{1+e}{1-e}}\,\frac{\cos(\pi-\phi)}{(1-e)^3} + \cdots$$

a, i, π, ϕ étant le demi-grand axe, l'inclinaison, et les longitudes du périhélie et du nœud.

Les symboles (m_1, x_1, y_1, z_1), (m_2, x_2, y_2, z_2) sont les masses et les coordonnées des planètes troublées et troublantes au temps t. J'ai trouvé qu'au temps T, après le temps t, on peut exprimer par une série la correction à faire aux coordonnées *elliptiques* x_1, y_1, z_1, pour avoir les coordonnées dans l'orbite troublée. Le coefficient de T^4 dans cette série, sauf un facteur connu de l'ordre m_2, est (pour la correction de x_1) :—

$$\frac{x_1}{r_1^3\rho_{12}^3} - \frac{x_2}{r_2^3\rho_{12}^3} - \frac{(m_1+m_2)(x_2-x_1)}{\rho_{12}^6} + \frac{(1+m_2)\,x_2}{r_2^6} + \frac{m_1x_1}{r_1^3r_2^3} + \frac{m_1(x_2-x_1)}{r_1^3\rho_{12}^3}$$
$$-\frac{6(x'_2-x'_1)\,\rho'_{12}}{\rho_{12}^4} + \frac{15(x_2-x_1)\,\rho'^2_{12}}{\rho_{12}^5} + \frac{6x'_2r'_2}{r_2^4} - \frac{12x_2r'^2_2}{r_2^5}$$

$$-\frac{3(x_2-x_1)^2}{\rho_{12}^5}\left\{\frac{x_1}{r_1^3} - \frac{x_2}{r_2^3} - \frac{(m_1+m_2)(x_2-x_1)}{\rho_{12}^3}\right\} - \frac{3(x_2-x_1)(x'_2-x'_1)^2}{\rho_{12}^5}$$
$$-\frac{(x_2-x_1)(y_2-y_1)}{\rho_{12}^5}\left\{\frac{y_1}{r_1^3} - \frac{y_2}{r_2^3} - \frac{(m_1+m_2)(y_2-y_1)}{\rho_{12}^3}\right\} - \frac{3(x_2-x_1)(y'_2-y'_1)^2}{\rho_{12}^5}$$
$$-\frac{3(x_2-x_1)(z_2-z_1)}{\rho_{12}^5}\left\{\frac{z_1}{r_1^3} - \frac{z_2}{r_2^3} - \frac{(m_1+m_2)(z_2-z_1)}{\rho_{12}^3}\right\} - \frac{3(x_2-x_1)(z'_2-z'_1)^2}{\rho_{12}^5}$$

$$-\frac{3x_2^2}{r_2^5}\left\{\frac{m_1(x_2-x_1)}{\rho_{12}^3} + \frac{(1+m_2)\,x_2}{r_2^3} + \frac{m_1x_1}{r_1^3}\right\} + \frac{3x_2}{r_2^5}\left(x'^2_2 + y'^2_2 + z'^2_2 - r'^2_2\right)$$
$$-\frac{3x_2y_2}{r_2^5}\left\{\frac{m_1(y_2-y_1)}{\rho_{12}^3} + \frac{(1+m_2)\,y_2}{r_2^3} + \frac{m_1y_1}{r_1^3}\right\} - \frac{3x_2z_2}{r_2^5}\left\{\frac{m_1(z_2-z_1)}{\rho_{12}^3} + \frac{(1+m_2)\,z_2}{r_2^3} + \frac{m_1z_1}{r_1^3}\right\}.$$

Les symboles x', y', z' sont les derivées premières par rapport au temps ; ρ_{12} est la distance mutuelle des masses m_1 et m_2.

Naples, 11 *mars* 1879.

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